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ABSTRACT

This study evaluated the science, mathematics, and technological needs of teachers in eastern North Carolina, establishing how to best serve their professional development needs. A survey instrument was constructed to collect information from North Carolina teachers who served as Professional Development Liaisons (PDLs). The survey consisted of 11 questions pertaining to general information about the teacher, teacher professional development needs, and Eastnet, an educational Web site for eastern North Carolina teachers. Analysis of data from 103 surveys and from follow-up interviews with 14 teachers indicated that the top three professional development items respondents mentioned needing the most were in the areas of educational technology, curriculum development, and inquiry. Most respondents indicated that the topic and location of the professional development workshop were the main factors deciding whether they attended. Over half of the respondents indicated that the best time for them to attend professional development workshops was during professional development days. The themes of educational technology and grant writing emerged during the follow-up interview. (Contains 9 references.) (SM)

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Teacher Professional Development Needs:
in Science, Mathematics, and Technology in Eastern North Carolina

Abstract

The Center for Science, Mathematics, and Technology Education at East Carolina University surveyed Professional Development Liason teachers in Eastern North Carolina.

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Teacher Professional Development Needs
in Science, Mathematics, and Technology in Eastern North Carolina

Introduction

If the goal of professional development is to have teachers make positive changes in K-12 science, mathematics, and technological education then teachers need educational resources to implement National and State objectives. "Current reform efforts require substantive changes in how science is taught; an equally substantive change is needed in professional development practices "(National Research Council, 1996). Demands and expectations cannot be made of educators to make changes in their curriculum if they lack the funding to do so (Becker, 1999). Educators need to know how to exercise strategies to have students achieve high academic standards in science, mathematics, and technology education (Loucks-Horsley, 1998). This requires teachers being able to observe and gain a knowledge base from successful curriculum programs already in place to influence teaching practices. (MCcullen, 2001; United States Department of Education, 1999).To accomplish this task teachers need support from colleges, colleagues and administrators, and the business community (Becker, 1999). Professional Development and in-service initiatives in education need to focus more on the procurement of technological tools in education, instead of only advocating its use in the classroom.

Ideally the intention of current teacher in-service programs should parallel National and State competencies. According to the National Science Education Standards, "policies that influence the practices of science education must be congruent with the program, teaching, professional development, assessment, and content standards while allowing for adaptation to local circumstances." (National Research Council, 1996). However, this is not always the case. Therefore, teachers need to be continuously assessed to establish their professional needs and be made aware of professional development programs in their area of interest.

Purpose

The purpose of this investigation was to evaluate the science, mathematics and technological needs of the teachers in Eastern North Carolina and to establish how to best serve the professional development needs of these teachers.

Sample Selection

The Center for Science and Mathematics Technology Education at East Carolina University addresses the pedagogical needs in science, mathematics, and technology for 13,263 teachers in Eastern North Carolina. Each of the 328 schools in the region has at least one teacher who volunteers to serve as a Professional Development Liason (PDL). A survey was administered to the PDL teachers. The PDL teachers were surveyed because they are responsible for communicating with the Center for Science Mathematics and Technology education at East Carolina University about issues concerning K-12 mathematics, science, and technology education. The PDL teachers are also responsible for sharing information to administrators and colleagues about research summaries,

national level documents, North Carolina State Department of Instruction initiatives, and North Carolina State School Board decisions in science, mathematics, and technology education. The CSMTE and PDL teachers also work together to address the local needs of educators in science, mathematics, and technology disciplines.

Design of study

A survey instrument was constructed to collect information from the PDL teachers in Eastern North Carolina. The survey consisted of eleven items pertaining to general information about the teacher, teacher professional development needs, and Eastnet, an educational web site for Eastern North Carolina Teachers. The CSMTE personnel and researcher developed the questions. The entire questionnaire was designed to take approximately twenty minutes to complete (See Questionnaire).

Data Collection and Sample Demographics

On November 20, 2000, four hundred fifty PDL teachers were mailed a questionnaire to complete by December 15, 2000. A total of 103 PDL teachers returned completed questionnaires. This translated into a 23% response rate. These PDL teachers represented twenty-four counties in Eastern North Carolina. The largest percentages of respondents were from Pitt County (17 %), and Nash County (11%). Thirty-nine of the respondents indicated that they taught in grades 9-12, thirty teachers taught in grade levels 6-8, thirty-two teachers indicated that they taught in grades K-5 and two teachers did not indicate a grade level.

On March 3, 2001 a follow-up oral interview session was conducted to further assess the professional needs of the PDL teachers. Fourteen PDL teachers out of 58 volunteered to participate in the interview session. Each of the fourteen teachers was asked to provide information on what they perceived were their professional development needs. Their oral responses were recorded in writing by the CSMTE staff.

Results of the Survey

Question items 1, 7, 8, 9, 10, and the one open ended question on the survey instrument were used to answer the research questions. Responses from question one on the survey were based on a Likert scale which included the choices 4 = needed the most, 3= needed, 2 = needed somewhat, and 1= not needed. The respondents were asked to rate each the following types of professional development items. The table below includes a percentage of PDL teachers that rated the item as a 4 = needed most.

Professional Development Item	**Percentage (%)**
Educational Technology-implementing technology into your existing curriculum	47%
Curriculum Development-creating new instructional material and strategies existing ones to better meet the learning need of students	39%

Inquiry- how to engage students into hands-on and minds on authentic learning activities	32%
National Board Certification or New Teacher Portfolio	25%
How to Create Web Page	25%
Grant Writing-how to apply for grants	25%
Partnerships-focus to help surrounding community realize its responsibility in student success	23%
New Teacher Mentor Support-ensure that every new teacher (1-3 years) has quality support from master teachers	20%
Math and Science Through Literature	18%
Classroom Management-techniques to better manage the classroom environment	18%
Meeting Diverse Needs in High School Algebra and Geometry	18%
AIMS-hands on program integrating mathematics and science K-9	13%
Reflection-tools and techniques to help teachers develop a reflective practice	11%
GLOBE-a program designed for students to investigate the environment in hydrology, atmosphere, land cover, and soil	8%

The top three professional development items that the PDL teachers indicated that they needed the most were in the areas of educational technology- (47%), curriculum development (39%) and Inquiry (32%).

The K-5 grade level PDL teachers also indicated (mean >3) that educational technology and inquiry were the types of professional development programs needed. In addition, the 6-8 grade level teachers agreed (mean > 3) that educational technology and curriculum development were areas of needed professional development, and finally the 9-12 grade level teachers reported (mean>3) that educational technology, curriculum development, and inquiry were a needed part of their professional development.

For question item 7 the respondents were asked to circle all major deciding factors for determining whether or not to attend a professional development workshop. An overwhelming number of PDL teachers (87% and 76% respectively) indicated that the topic and location were major deciding factors. Fifty-seven percent of these respondents reported that teacher renewal credit was a determining factor on whether to attend a professional development workshop followed by 33% indicating that a stipend was an influential factor on this decision. Finally 22% of the respondents concluded that obtaining continuing education credit was a determining factor and 6% of them indicated obtaining graduate credit was important in this decision.

In addition, fifty-three percent of the teachers surveyed indicated that the best time for them to attend a professional development workshop was during professional development days. Less than half of these teachers circled that they would attend a professional development workshop during the summer (43%), the school week (22%), or on a Saturday (12%) (Question item 9). However, nearly the same percentage of respondents reported that they would attend a professional development workshop at the school (86%), local college/university (80%) and schools within 1 hour (74%) Only seventeen percent of the PDL teachers indicated that they would attend a professional development workshop at a school more than an hour away (Question item 8).

Twenty-two of the PDL teachers completed the open-ended question on the survey instrument. The respondents were asked to expound on concerns or issues that could best meet their professional development needs. One major theme emerged as a result of the data analysis. Eight of these teachers (n= 22) addressed professional

development needs in the area of educational technology. For example, one teacher noted interest in using the internet as an instructional tool in the classroom. Another teacher wanted to incorporate laptop computers and CBLs into teaching. Several teachers wrote that they were interested in attending a professional development workshop related to technology or obtaining technology renewal credits specifically associated with 8th grade level computer skill competencies. Finally, these teachers expressed a need on how to obtain help on integrating existing technology at the school into the science and mathematics curriculum.

Two themes emerged during the oral follow-up interview session with the PDL teachers: 1) educational technology and 2) grant writing. Eleven of these teachers (n=14) made statements related to including technology in classroom teaching. Many of their statements were similar to the responses given to the open-ended question on the survey instrument. These teachers indicated that they wanted to be better trained on how to use technology in the classroom. They not only wanted to be provided with opportunities to learn how to integrate technology into their lessons, but also wanted to have access to web resources and free technological equipment. Additionally, oral responses included having more technology in-service (i.e., math and science technological institutes) applicable to students such as the use of Powerpoint, digital camera, and Hyperstudio. Some of these (6 of the 14) PDL teachers during the oral interview also perceived a need for grant writing workshops. They voiced an interest in wanting to attend in-service programs on how to find and write grants. These teachers wanted workshops to help them find funding for their classroom teaching needs.

Conclusions

Across the nation teacher licensing institutions are stressing the importance of integrating technology into K-12 science instruction (Faison, 1996). More specifically, in North Carolina students in grades K-12 are expected to achieve three computer/technology curriculum objectives: 1) understand the important issues of a technology-based society and exhibit ethical behavior in the use of computer and other technologies, 2) demonstrate knowledge and skills in the use of computer and other technologies, and 3) use a variety of technologies to access, analyze, interpret, synthesize, apply, and communicate information (North Carolina Department of Public Instruction, 1998/1999) . For each advancing grade the competency goals progressively become more complex. Teachers need funding and training programs to be able to continuously mainstream changing technology into their existing curriculum.

Yet as presented by Carol McCullen (2001) there are many barriers to the use of technology in the classroom. Teachers report the lack of access to hardware, time for professional development in technology, or time to add technology into the curriculum as obstacles to including technology in their instruction (McCullen, 2001). According to Adams (2001), many teachers are also resistant to change and using technological tools and equipment to teach students. The implementation of technology is limited by the lack of motivation of the teachers to want to teach differently or innovatively have students pass technology state and national tests (Adams, 2001). According to Becker (1999), teachers in low socioeconomic schools may have less expertise and access to technology. Over half (58%) of 24 counties represented in this

study have parental income in the bottom 50 out of 100 counties in the state of North Carolina (U.S. Department of Commerce, Economics & Statistics Administration, Bureau of Economics Analysis, May 2002). These school teachers need the financial support of the business communities to assist with providing their schools with the resources that they need. In addition, colleges and university instructors should not be emphasizing the use of advance theories and technology in the classroom without information on how to obtain the training and the monies to incorporate these new methods of instruction into their curriculum.

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1. Which of the following types of professional development do you need most? (4 = needed most, 3 = needed, 2 = needed somewhat, 1 = not needed)

	4	3	2	1
Curriculum Development – creating new instructional materials and strategies existing ones to better meet the learning needs of students.				
Grant Writing – how to apply for grants for your school needs				
Educational Technology - implementing technology into your existing curriculum				
Inquiry – how to engage students into hands-on and minds-on authentic learning activities				
GLOBE – a program designed for students to investigate the environment in hydrology, atmosphere, land cover, and soil				
Classroom Management – techniques to better manage the classroom environment				
Math and Science Through Literature				
How to Create Web Pages				
Reflection – tools and techniques to help teachers develop a reflective practice				
Meeting Diverse Needs in High School Algebra and Geometry				
AIMS – hands on program integrating mathematics and science K-9				
Partnerships – focus to help surrounding community realize its responsibility in student success				
National Board Certification or New Teacher Portfolios				
New Teacher Mentor Support – ensure that every new teacher (1-3 years) has quality support from master teachers				

2. Do you currently use EastNet (http://www.eastnet.ecu.edu an educational website for Eastern North Carolina)? (Circle One)

Yes No If so, what do you use it for?

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3. What types of things would you like to see on EastNet (Circle all that apply)

Lesson Plans On-line Classes Equipment for loan Technology tutorials Featured Schools

Partnership opportunities Live chats Grant opportunities Workshop opportunities

Other:_____

4. EastNet offers free web hosting space for K-12 eastern North Carolina teachers. Would you be interested in using EastNet to host a web site for your class? (Circle one)

Yes No

5. Would you be interested in having your class or school featured on EastNet? (Circle one)

Yes No

6. If EastNet were to offer on-line technology courses for teachers, would you be interested in taking one? (Circle one)

Yes No

7. What is the major deciding factor when you are determining whether or not to attend a professional development workshop? (Circle all that apply)

Graduate Credit Continuing Education Credit Teacher Renewal Credit

Location Topic Stipend

8. What grade level(s) are you currently teaching? (Circle one)

K-5 6-8 9-12

9. When is the best time for you to attend a professional development workshop? (Circle one)

During the school Week Saturday Summer Professional Development Days

10. Where would you attend professional development workshops? (Circle all that apply)

At your school Local college/university Schools within 1 hour Schools more than 1 hour

11. In what county do you currently teach?_____

Open Ended Question.

Please use the space provided below to describe how the Office of Educational Outreach can best meet your professional development needs. Please expound upon any issues addressed or not addressed in this questionnaire that are of concern to you or that we could help you with.

Thank you for your input. It will make a difference to all teachers in Eastern North Carolina.

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